Improving the quality of in-hospital resuscitation – a comprehensive approach
Helping you deliver high-quality care

When sudden cardiac arrest (SCA) occurs in your hospital, you need to intervene immediately. The speed and skill with which your teams respond to this life-threatening emergency can potentially influence its outcome. But to deliver the best-possible care and make the right decisions every step of the way, your staff need access to the right knowledge, resources, and equipment.

The European Resuscitation Council’s (ERC) guidelines deliver expert advice and best practices for resuscitation, based on real-world clinical experience. In its guidelines on in-hospital resuscitation, published in 2015, the ERC shifted its focus to enhancing the quality of interventions, with the aim of improving outcomes.

As it stands, “once cardiac arrest occurs, only about 20% of patients who have an in-hospital cardiac arrest will survive to go home.” Increasing this number is a key challenge for today’s healthcare players like you.

Nihon Kohden helps you address this issue and meet the new guidelines with a broad portfolio of technology and expertise that spans the entire emergency intervention pathway.

Our holistic, end-to-end solutions are designed to support you at every stage of the care chain – from early detection, to timely responses and high-quality interventions, to follow-up care and monitoring.

Your challenges begin even before a sudden cardiac arrest occurs in your hospital – and continue well beyond resuscitation itself. Nihon Kohden can support you every step of the way.

Your resuscitation challenges

SCA

Early detection

Timely responses

Quality of CPR

Ongoing care

Your challenges begin even before a sudden cardiac arrest occurs in your hospital – and continue well beyond resuscitation itself. Nihon Kohden can support you every step of the way.
Reading the signs

**ERC Guidelines 2015 on early detection of patient deterioration**

“Early recognition of the deteriorating patient and prevention of cardiac arrest is the first link in the chain of survival. Hospitals should provide a system of care that includes: (a) educating staff about the signs of patient deterioration and the rationale for rapid response to illness, (b) appropriate, and frequent monitoring of patients’ vital signs, (c) clear guidance to assist staff in the early detection of patient deterioration.”


**Act in good time**

Patients may show signs of deterioration that can point to imminent cardiac arrest several hours before it occurs. Learning to recognize and respond to these events could help avert a potentially life-threatening situation. Subtle changes in heart rate, blood pressure, respiratory rate, and body temperature are all known possible early indicators of a cardiac emergency. But how do you know when to intervene?

Monitoring at-risk individuals helps you spot the warning signs early on, giving you time to respond and make informed therapy decisions. Educating your staff to identify any change in a patient’s condition as potentially significant, and training them to take the right action could play a part in reducing the incidence of in-hospital cardiac arrest.
Stay in the picture
You can gain timely insight into vital parameters with Life Scope, our extensive range of patient monitoring solutions. Flexibility, versatility, and modularity help you meet diverse requirements across multiple care areas and levels of acuity. From non-invasive models with basic functionality to high-end devices, the Life Scope series lets you access the metrics you need, when and where you need them.

Nihon Kohden offers a range of devices, including portable, wireless, and wearable monitors, as well as central station and networking solutions. All our technology supports intuitive, reliable operation in tune with the needs of your specific care environment.

Use your data
The data you collect during patient monitoring is a highly valuable asset. Targeted analysis of this information can help you fine-tune your responses and processes for the future. This approach supports ongoing education and training of your staff and helps you drive toward continuous improvement.

Our solution for early detection
Comprehensive vital signs monitoring helps you spot deterioration early. Our Life Scope series provides the technology you need to keep a closer eye on your patients across care areas and acuity levels.
Responding in a heartbeat
When an in-hospital cardiac arrest occurs, time is of the essence. No matter where in the hospital the emergency is, you need to act fast. But you face the challenge of getting the right knowledge and equipment to the right place at the right time.

A two-tiered response strategy comprising immediate basic life support (BLS) followed by advanced life support (ALS) delivered by trained resuscitation professionals can improve the quality – and outcome – of your efforts. This approach lets you intervene faster and reduces the time to the first shock. And it can have a positive effect on the patient’s survival.

ERC Guidelines 2015 on attempting defibrillation within 3 minutes

“We recommend the use of AEDs in those areas of the hospital where there is a risk of delayed defibrillation, because it will take several minutes for a resuscitation team to arrive, and first responders do not have skills in manual defibrillation. The goal is to attempt defibrillation within 3 min of collapse. In hospital areas where there is rapid access to manual defibrillation, either from trained staff or a resuscitation team, manual defibrillation should be used in preference to an AED. Hospitals should monitor collapse-to-first shock intervals and audit resuscitation outcomes.”


Time is tissue
The ERC recommends administering defibrillation within three minutes of cardiac arrest. But your resuscitation team may need longer than that to reach the patient. This is where Nihon Kohden’s Cardiolife AED series comes in, providing rapid, simple-to-use instruction for trained and untrained individuals.

Our robust Cardiolife AED devices are compact and user-friendly, delivering easy-to-follow on-screen and voice instructions that clearly guide first responders through the key steps.

Moreover, once the ALS team arrives on the scene, the AED pads can be quickly transferred to the Nihon Kohden Cardiolife TEC series as both devices use the same connectors. This supports a smooth transition to the second tier of life support, and reduces the number of pads you use.

Cardiolife AED-3100
Fast, safe, and easy to use

• Durable and compact AED, ready for use when required
• Simple, user-friendly operation for immediate basic life support anywhere on your site
• Uses the same pads as the Cardiolife TEC-5600, for smooth transition to the next tier
• Unique ActiBiphasic waveforms for improved shock efficiency

Cardiolife TEC-5600
Improving quality of resuscitation

• Fast, intuitive, and effective defibrillation using ActiBiphasic waveforms
• Standby charging and ECG waveform analysis during CPR
• Easy to transfer pads from the Cardiolife AED-3100, thanks to smart connectors

The faster the better

In-hospital resuscitation – a two-tiered approach

Collapsed / sick patient

Shout for help & assess patient

No

Signs of life?

Yes

Call resuscitation team

CPR 30:2 with oxygen and airway adjuncts

Apply pads/monitor Attempt defibrillation if appropriate

Tier one: BLS

Assess ABCDE Recognize & treat Oxygen, monitoring, IV access

Call resuscitation team if appropriate

Handover to resuscitation team

Tier two: ALS

Advanced Life Support when resuscitation team arrives

In-hospital resuscitation algorithm. ABCDE – Airway, Breathing Circulation, Disability, Exposure; IV – Intravenous; CPR – Cardiopulmonary resuscitation may.

Our solution for timely responses

A two-tiered strategy helps you intervene quickly. Our Cardiolife AED series is always ready for use and helps you deliver defibrillation within the recommended three minutes. Plus, you can smoothly transition to advanced life support.
ERC Guidelines 2015 on reducing the pre-shock pause

“The importance of uninterrupted chest compressions cannot be overemphasized. Even short interruptions to chest compressions are disastrous for outcome and every effort must be made to ensure that continuous, effective chest compression is maintained throughout the resuscitation attempt. Chest compressions should commence at the beginning of a resuscitation attempt and continue uninterrupted unless they are paused briefly for a specific intervention (e.g. rhythm check). Most interventions can be performed without interruptions to chest compressions.”

Nihon Kohden’s defibrillators come with unique standby charging and our continuous ventricular fibrillation analysis technology (VF/VT analysis). This helps you significantly cut heartrate analysis time, and reduce the pre-shock pause. As a result, you can minimize interruptions to all-important chest compressions. In addition, our noiseless pads reduce artifacts during CPR, giving you a clearer view of underlying ECG signal even during compressions, helping you shorten the pre-shock pause, also in manual defibrillation mode.

What’s more, in contrast to other defibrillators that charge only on demand, our machines charge on a standby basis. This means as soon as the device detects the need to shock, a charge is present. If the shock is not required, it is automatically disarmed. Concurrent charging and Nihon Kohden’s continuous VF/VT analysis technology can help you meet ERC guidelines for keeping hands-off time to a minimum.

Minimize the pre-shock pause

The ERC recommends giving manual chest compressions of at least 5 cm but no more than 6 cm at a rate of 100 to 120 compressions a minute. Hands-off pauses to deliver targeted interventions such as ventilation and defibrillation should not be longer than five seconds. How do you meet these requirements while ensuring high-quality resuscitation care?

Conventional AED mode

Analyzing heart rhythm  
Shock advised  
Press flashing shock button

CPR  
VF analysis  
Charging

Energy charging starts after the shock is advised.

Nihon Kohden’s solution for continuous VF/VT analysis and standby charging

Analyzing heart rhythm  
Shock advised  
Press flashing shock button

CPR  
VF analysis and confirmation  
Charging

ECG analysis and charging takes place during CPR, minimizing the pre-shock pause.
How is my patient responding?

As the ERC guidelines state, measuring end-tidal CO₂ using waveform capnography during CPR is a useful way of gauging the quality of resuscitation. It can help you confirm correct placement of a tracheal tube and delivers valuable insight to aid decision making.

During CPR, EtCO₂ values are generally low. Higher values may indicate better quality CPR, so keeping a close eye on these readings can help you adjust your efforts accordingly. An increase in EtCO₂ may also indicate return of spontaneous circulation (ROSC). Having this information early means you can avoid administering potentially harmful doses of adrenaline.

Our Cardiolife TEC series defibrillators are equipped with Nihon Kohden’s unique capONE technology. This is the world’s smallest, lightest, fastest, and most durable mainstream EtCO₂ sensor for intubated and non-intubated patients. Designed for oral and nasal breathers, capONE helps you get a clear EtCO₂ reading and take the right action. Its unique oxygen delivery system is ideal for patients receiving continuous oxygen.

ERC Guidelines 2015 on the use of waveform capnography

“There is a new section on monitoring during ALS with an increased emphasis on the use of waveform capnography to confirm and continually monitor tracheal tube placement, quality of CPR and to provide an early indication of return of spontaneous circulation (ROSC).”¹

“The role of waveform capnography during CPR includes²:
• Ensuring tracheal tube placement in the trachea;
• Monitoring ventilation rate during CPR and avoiding hyperventilation;
• Monitoring the quality of chest compressions during CPR. EtCO₂ values are associated with compression depth and ventilation rate: a greater depth of chest compression will increase the value;
• Identifying ROSC during CPR.”


Our solution for enhancing quality of CPR

A short pre-shock pause and continuous EtCO₂ monitoring using waveform capnography help improve resuscitation quality. Our VF/VT analysis, noiseless pads, and capONE sensor support excellent quality care.
Continuous learning

In your line of work, nothing stands still – the healthcare environment is continuously evolving and you’re constantly adapting and developing your processes. Regular training and performance analysis can help you enhance the skills of everyone involved in the resuscitation care chain – with the aim of making lasting improvements to quality and outcomes.

ERC Guidelines 2015 on improving quality through continuous training

“Feedback to members of an in-hospital cardiac arrest team about their performance in an actual cardiac arrest (as opposed to the training environment) can lead to improved outcomes. This can either be real-time and data-driven (e.g. use of feedback devices on cardiac compression metrics) or in a structured post-event performance focused debriefing.”


ERC Guidelines 2015 on the detection of right ventricular MI

“Right precordial leads should be recorded in all patients with inferior STEMI in order to detect right ventricular MI. Isolated ST-depression ≥0.05 mV in leads V1 through V3 represents STEMI in the inferobasal portion of the heart which may be confirmed by ST segment elevation in posterior leads (V7–V9).”

European Resuscitation Council Guidelines for Resuscitation 2015 Section 8. Initial management of acute coronary syndromes. P266

Do I have the full picture?

In some cases, you require more data than a standard 12-lead ECG can provide. If, for example, you suspect you’re dealing with a posterior or right ventricular MI patient, the ERC recommends the use of right precordial and posterior leads. Yet, in an emergency situation, applying electrodes on the back presents challenges.

Nihon Kohden’s synECi18 technology provides synthesized 18-lead readings using a regular 12-lead approach to mathematically derive waveforms for the right chest and back leads. This gives you the information you need to detect posterior and right ventricular MI in a simpler, faster way. Using the solution for every MI patient gives you a reliable basis for identifying this condition, which can often be overlooked when just 12 leads are used. This improves diagnostic accuracy and helps you deliver the treatment your patient needs.
ERC Guidelines 2015 on post-resuscitation care and NeuroMonitoring

“Seizures are common after cardiac arrest and occur in approximately one-third of patients who remain comatose after ROSC [...] Use intermittent electroencephalography (EEG) to detect epileptic activity inpatients with clinical seizure manifestations. Consider continuous EEG to monitor patients with a diagnosed status epilepticus and effects of treatment.”


All eyes on the patient

Your holistic approach to resuscitation goes beyond advanced life support to include post-event care. But how do you gain access to the facts and figures you need along the entire pathway?

Continued monitoring helps you track progress, spot signs of deterioration, and deliver the precise care your patient needs. Nihon Kohden’s end-to-end portfolio is in step with your aims, with solutions that let you assess vital signs and identify the longer-term impact of cardiac arrest.

Our solution for ongoing care

Post-resuscitation care is a key part of the process. Our comprehensive monitoring solutions provide valuable insight into key parameters on the ICU and during transport. Our high-quality NeuroMonitoring systems let you detect seizures and monitor the effects of drug therapy.

Since foundation in 1951, Nihon Kohden’s mission has been to improve the quality of life with advanced technology. We provide solutions for diagnosis, critical care, clinical information, and in vitro diagnostics – and we are dedicated to collaborating with you to confront the challenges of healthcare today and tomorrow.
Improving Healthcare with Advanced Technology

To explore Nihon Kohden’s solutions along the resuscitation pathway, please visit nihonkohden.com